

##C718180 : MAJOR METALLURGICAL ENGINEERING

KEY WORD: XPS / HYDROCHLORIC ACID / SODIUM CHLORIDE / SURFACE FILM / 304L STAINLESS STEEL

JARAN SABSEREE : SURFACE CORROSION BEHAVIOR OF THE 304L

STAINLESS STEEL. THESIS ADVISOR : Dr.-Ing. GOBBOON LOTHONGKUM

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Surface corrosion behavior the of 304L stainless steel in hydrochloric acid, sodium chloride, and mixtures of both solutions was investigated by measuring polarization curves at various concentrations and temperatures. Surface films on test samples were analyzed by XPS. They were found to be composed of layers of metal hydroxide, metal oxide, a mixture of chromium oxide and metallic iron/nickel. Chemical compositions of the films depend on concentration and temperature. For the case of hydrochloric acid and mixtures of hydrochloric acid and sodium chloride solutions, increasing total chloride concentration increases the concentrations of metal hydroxide, whereas those of metal oxide, chromium, and iron are decreased. It also raises the passive current density while pitting potential is reduced.

For the case of sodium chloride solutions, increasing chloride concentration decreases metal hydroxide content of the films. It also reduces the pitting potential. However, it has negligible effects on the passive current density and the chromium content of the film.

Chromium and iron contents of the films were found to decrease with increasing solution temperature. In the samples which were treated with acid solutions, the oxygen content of the films was decreased with increasing temperature whereas that of the sodium chloride-treated was increased. Destabilizing chloride was not found in the film layers. All the results implies that the deprotonization of water is the dominant film-generating mechanism.

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